NEO – Adaptive Training Integrative Knowledge System (MATRIKS) to Improve Operational Performance and Its Neural Basis for Spaceflight

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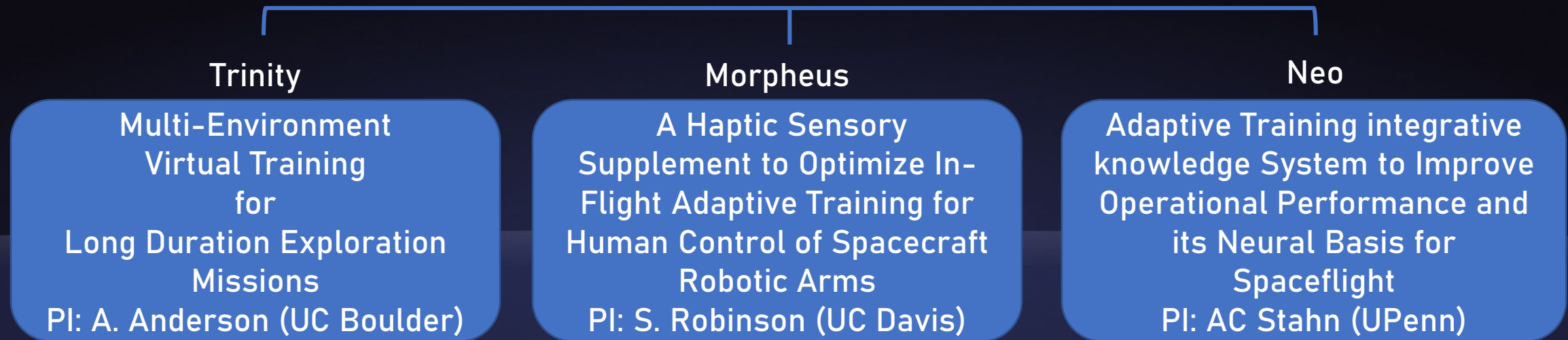
Rationale

- With prolonged deep space missions not all skills and knowledge can be retained and retrieved based on pre-mission training alone.

- Limited and delayed communication will significantly constrain support from Mission Control and crews will increasingly rely on autonomous onboard technologies to successfully perform post-landing operations.
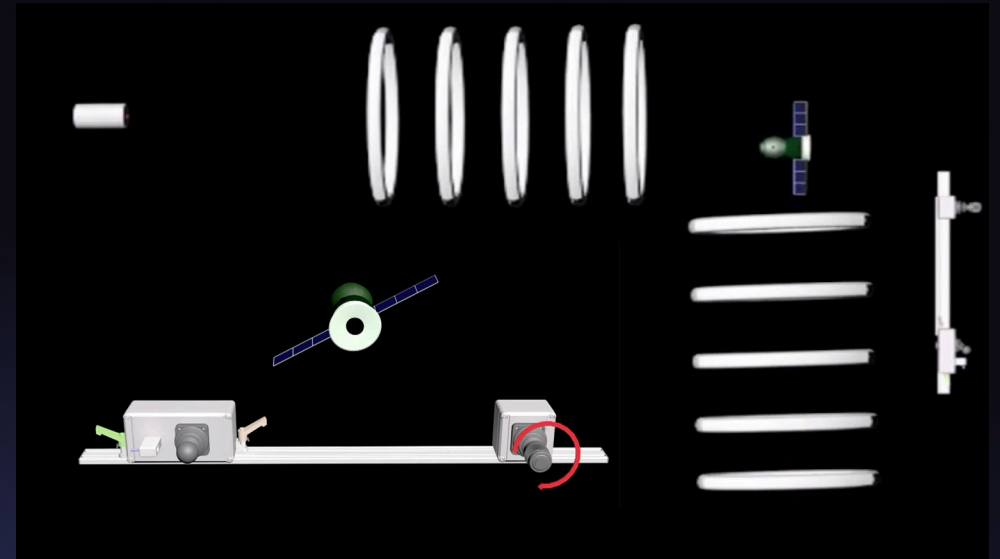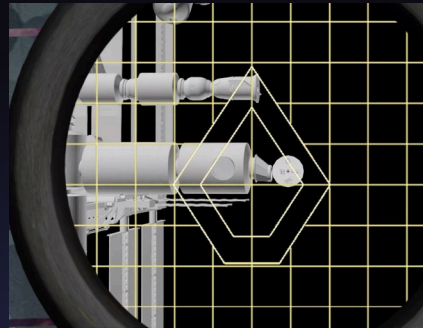
Objective

To investigate the efficacy of an autonomous and adaptive training system for consolidating and improving operational skills in N=16 crew members in one HERA campaign of 45 days duration.

NSCOR MATRIKS

| Trinity	Morpheus	Neo
Multi-Environment Virtual Training for Long Duration Exploration Missions PI: A. Anderson (UC Boulder)	A Haptic Sensory Supplement to Optimize In-Flight Adaptive Training for Human Control of Spacecraft Robotic Arms PI: S. Robinson (UC Davis)	Adaptive Training integrative knowledge System to Improve Operational Performance and its Neural Basis for Spaceflight PI: AC Stahn (UPenn)

Neo

Neo simulates a rendezvous and docking maneuver using real spacecraft flight dynamics.

Specific Aims

SA1: Identify the neural circuitry underlying the Neo task during functional magnetic resonance imaging (MRI) in a total of up to N=30 subjects with varying levels of Neo training experience.

Specific Aims
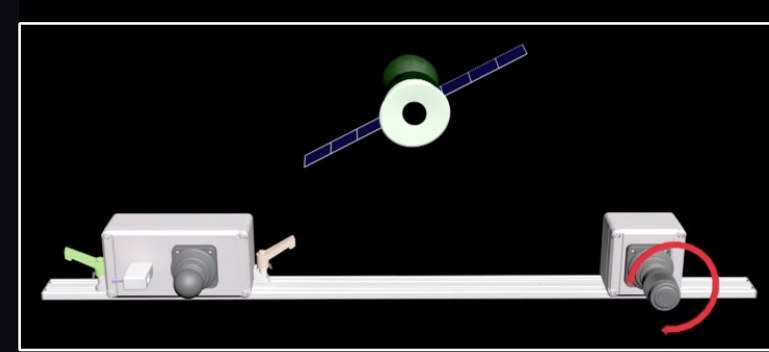
SA2: Investigate whether, and to what extent MATRIKS will promote transfer to

Cognition Battery

Spatial Cognition Battery

ROBoT-r

Specific Aims Neo

SA3: Identify the relationship between changes in brain structure and function using MR imaging, and changes in operational and cognitive performance in N=16 HERA crew members.

Deliverables

- Demonstrate the use of a neuroscience-based, adaptive training integrative knowledge system to to acquire and retain operational skills that are critical for exploration class missions.

- The system could help to reduce the likelihood or impact of potential decrements in human performance capabilities during long-duration space missions.

Acknowledgement

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